1. (a) (i) \( y + x - 2 = -3 \), so \( y = -3 - x + 2 \), so \( y = -x - 1 \). Hence this is a straight line, with negative gradient and negative \( y \)-intercept. Hence the matching graph is Graph J.

(ii) \( y = 3x^2 + 2 \). This equation includes an \( x^2 \) term with a positive coefficient, so the graph is a parabola which turns upwards. Also, the \( y \)-intercept is positive. Hence the matching graph is Graph O.

(iii) \( y = -|4x| \), which is a graph of negative absolute value. Hence the matching graph is Graph M.

(iv) \( y = -2x^2 - 1 \). This equation includes an \( x^2 \) term with a negative coefficient, so the graph is a parabola which turns downwards. The \( y \)-intercept is negative. Hence the matching graph is Graph T.

(v) \( y = x^2 - 1 \). This equation includes an \( x^2 \) term with a positive coefficient, so the graph is a parabola which turns upwards. The \( y \)-intercept is negative. Hence the matching graph is Graph Q.

(vi) \( y = -2x^2 + 1 \). This equation includes an \( x^2 \) term with a negative coefficient, so the graph is a parabola which turns downwards. Also, the \( y \)-intercept is positive. Hence the matching graph is Graph R.

(vii) \( 3y + 2x + 1 = 3 \), so \( 3y = 3 - 2x - 1 \), so \( 3y = -2x + 2 \). Hence this is a straight line, with negative gradient and positive \( y \)-intercept. Hence the matching graph is Graph H.

(viii) \( -y + 1 = 3 \), so \( -y = 2 \), so \( y = -2 \). Hence this is a horizontal line, with \( y \) negative. Hence the matching graph is Graph D.

(b) Let \( P \) be the amount invested, \( r \) be the interest rate per time period, \( x \) be the number of time periods and \( F \) be the final value. In each case, \( P = 100 \). Then:

(i) Interest compounds annually so we use the rate and number of time periods given in the question. Hence \( r = 6\% = 0.06 \) and \( n = 7 \), so \( F = 100(1 + 0.06)^7 = 100(1.06)^7 = 150.36 \).

The final balance is \( 150.36 \).

(ii) Interest compounds twice a year so we need to halve the rate and double the number of time periods given in the question. Hence \( r = 3\% = 0.03 \) and \( n = 14 \), so \( F = 100(1 + 0.03)^{14} = 100(1.03)^{14} = 151.26 \).

The final balance is \( 151.26 \).

(iii) Interest compounds 12 times a year so we need to divide the given rate by 12 and multiply the given number of time periods by 12. Hence \( r = 0.5\% = 0.005 \) and \( n = 84 \), so \( F = 100(1 + 0.005)^{84} = 100(1.005)^{84} = 152.04 \).

The final balance is \( 152.04 \).

(iv) Interest compounds continuously, so \( F = 100e^{0.06 \times 7} = 100e^{0.42} = 152.20 \).

The final balance is \( 152.20 \).

(c) (i) \( 100 = 10^2 \), so the answer is \( 2 \).

(ii) \( 1 = 10^{-6} \), so the answer is \( 0 \).

(iii) The answer is \( 3 \).

(iv) \( \frac{1}{e^5} = e^{-5} \), so the answer is \( -5 \).
2. (a) (i) \( y = -x^2 - 2 \). This equation includes an \( x^2 \) term with a negative coefficient, so the graph is a parabola which turns downwards. The \( y \)-intercept is negative. Hence the matching graph is Graph T.

(ii) \( x - 1 = 0 \), so \( x = 1 \). Hence this is a vertical line, with \( x \) positive. Hence the matching graph is Graph B.

(iii) \( y + 2x - 1 = -3 \), so \( y = -3 - 2x + 1 \), so \( y = -2x - 2 \). Hence this is a straight line, with negative gradient and negative \( y \)-intercept. Hence the matching graph is Graph J.

(iv) \(-2y + 2x - 3 = 3\), so \(-2y = 3 - 2x + 3\), so \(-2y = -2x + 6\), so \(2y = 2x - 6\). Hence this is a straight line, with positive gradient and negative \( y \)-intercept. Hence the matching graph is Graph E.

(v) \( 2y - 3 = -2 \), so \( 2y = 1 \). Hence this is a horizontal line, with \( y \) positive. Hence the matching graph is Graph C.

(vi) \(-y - 3x - 3 = -3\), so \(-y = -3 + 3x + 3\), so \(-y = 3x\), so \(y = -3x\). Hence this is a straight line, with negative gradient and passing through the origin. Hence the matching graph is Graph I.

(vii) \( y = x^2 + 1 \). This equation includes an \( x^2 \) term with a positive coefficient, so the graph is a parabola which turns upwards. Also, the \( y \)-intercept is positive. Hence the matching graph is Graph O.

(viii) \( y = e^x \), which is a graph of exponential growth. Hence the matching graph is Graph K.

(b) Let \( P \) be the amount invested, \( r \) be the interest rate per time period, \( x \) be the number of time periods and \( F \) be the final value. In each case, \( P = 100 \). Then:

(i) Interest compounds annually so we use the rate and number of time periods given in the question. Hence \( r = 30\% = 0.30 \) and \( x = 6 \), so \( F = 100(1 + 0.30)^6 = 100(1.30)^6 = 482.68 \).

The final balance is \( \$482.68 \).

(ii) Interest compounds twice a year so we need to halve the rate and double the number of time periods given in the question. Hence \( r = 15\% = 0.15 \) and \( x = 12 \), so \( F = 100(1 + 0.15)^{12} = 100(1.15)^{12} = 535.02 \).

The final balance is \( \$535.02 \).

(iii) Interest compounds 12 times a year so we need to divide the given rate by 12 and multiply the given number of time periods by 12. Hence \( r = 2.5\% = 0.025 \) and \( x = 72 \), so \( F = 100(1 + 0.025)^{72} = 100(1.025)^{72} = 591.72 \).

The final balance is \( \$591.72 \).

(iv) Interest compounds continuously, so \( F = 100e^{0.30 \times 6} = 100e^{1.80} = 604.96 \).

The final balance is \( \$604.96 \).

(c) (i) \( 1 = 10^0 \), so the answer is \( 0 \).

(ii) \( \frac{1}{10} = 10^{-1} \), so the answer is \( -1 \).

(iii) The answer is \( 6 \).

(iv) \( \frac{1}{e^3} = e^{-3} \), so the answer is \( -3 \).