

Question 1: Suppose f is an invertible function with $f(4) = 5$ and that the slope of the tangent line to $y = f(x)$ at $x = 4$ is $2/3$. Find the equation of the tangent line to the graph of $y = f^{-1}(x)$ at $x = 5$.

[5]

Question 2:

(a) Determine $\arccos(\cos(7\pi/4))$

[2]

(b) Simplify $\tan(\sin^{-1}(a/b))$. Your final answer should not contain any trigonometric or inverse trigonometric functions.

[3]

Question 3:

(a) Let $f(x) = \arcsin(e^x)$. Find $f'(x)$.

[2]

(b) Let $f(x) = e^{\arctan(1+x)}$. Find $f'(0)$.

[3]

Question 4: Find the following limits, if they exist:

(a) $\lim_{x \rightarrow 0} \frac{e^{(x^2)} - \cos(x)}{x^2}$

[2]

(b) $\lim_{x \rightarrow 0^+} \sqrt{x} \ln(x)$

[3]

Question 5: Find the absolute maximum and absolute minimum values of $f(x) = \frac{4x}{x^2 + 4}$ on the interval $[0, 5]$.

Question 6: For this question use the function $f(x) = 1 + 4x^3 + x^4$.

(a) Find the intervals of increase and decrease of f .

[8]

(b) State the relative (or local) extrema of f .

[2]

Question 7: For this question again use the function $f(x) = 1 + 4x^3 + x^4$.

(a) Find the intervals of concavity of f .

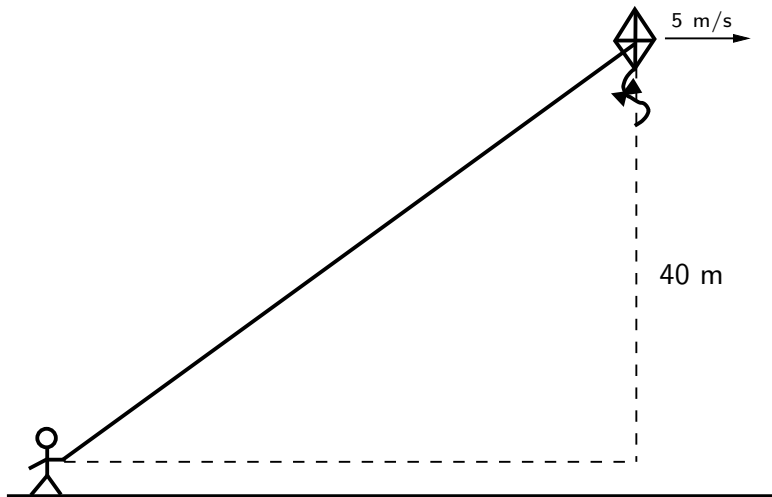
[8]

(b) State the inflection points of the graph of $y = f(x)$.

[2]

BONUS:

- (a) A girl is flying a kite which maintains a constant altitude of 40 m above her hand. The wind carries the kite horizontally away from her at a rate of 5 m/s. At what rate is the length of string from the girl to the kite changing when the string length is exactly 50 m?



[7]

- (b) Referring to part (a), at what rate is the angle between the string and the horizontal changing at that same instant?

[3]