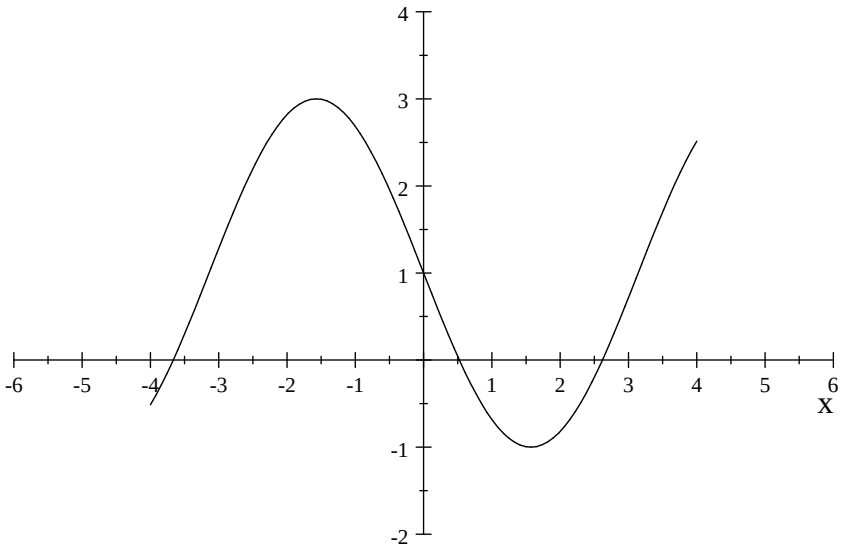
1	2	3	4	5	6	Total

Math 101 Exemption Exam 29.09.2010
Duration(90 minutes)
Name:
Student Number:

1. (10 pts) The graph of a function $f(x)$ is given below. Sketch the graph of the function $g(x) = -\frac{1}{2}f(x+2) + 1$.

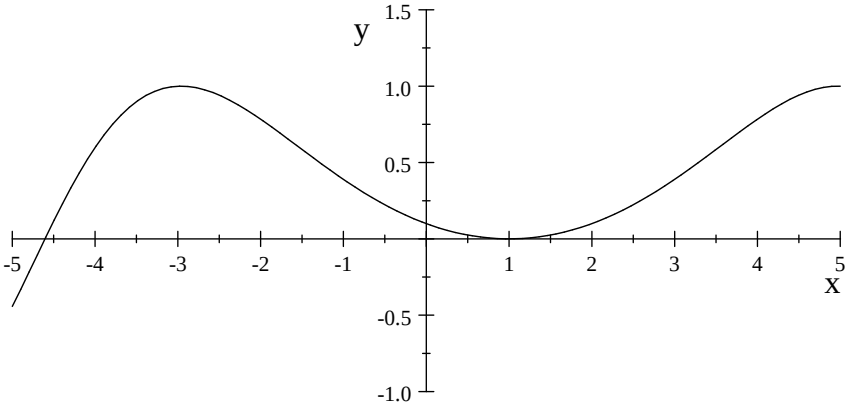


2. (15 pts) Find the points at which the function $f(x) = x^3 - 9x^2 - 48x + 52$ attains its local maximum, local minimum, and global maximum on the interval $(-3, 10)$, if they exist.

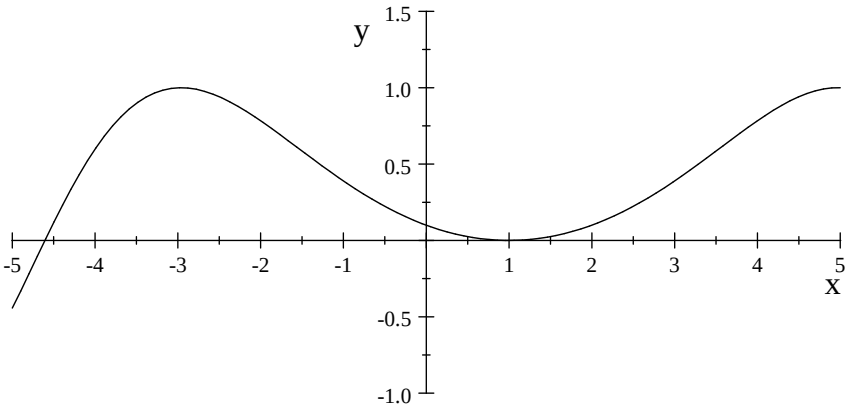
3. (10pt) Of all the cylinders with volume $8cm^3$ what are the dimensions of the one which has the maximum surface area. (No need to simplify your answer.)

4. (15 pts) The graph of a function $g(x)$ is given below.

(a) Sketch the graph of its antiderivative.



(b) Sketch the graph of g', the derivative of g.



5. (20 pts) Determine whether the statements below are true or false. Explain your answer. CORRECT ANSWERS WITHOUT ANY JUSTIFICATION WILL NOT GET CREDIT.

(a) The area under the curve $f(x) = \frac{1}{1+x^2}$ and above the x-axis is infinite.

(b) The graph of the function $f(x) = x^4 - x^3$ changes from being concave up to concave down at $x = 0$.

(c) The function $f(x) = \begin{cases} x\sin(\frac{1}{x}) & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$.

(d) Let f be a differentiable function such that $f(1) = 1$ and $f'(1) = 2$. Then the best linear approximation to f at $x = 1$ is $g(x) = 1 + 2x$.

6. (30 pts) Evaluate the following:

(a) $\lim_{x\to\infty} \dfrac{e^x + x^2}{2e^x + x}$

(b) $\lim_{x\to 0} \dfrac{\cos(x) - 1}{x^2}$

(c) $\dfrac{d}{dx}\left(\sin(\cos(x))\right)$

(d) $\displaystyle\int x\sin(x)dx$

(e) $\displaystyle\int \frac{e^t + 1}{e^t + t}dt$

(f) $\dfrac{d}{dx}\displaystyle\int_0^{x^2} \tan(y)dy$