McGill University

Quiz 1
Version B
MATH 141

Write your exam version in the answer sheet. No calculators!
Show all your work: marks are not given for answers alone.
Enclose this question sheet in your folded answer sheet.

(1) (10 Marks) Showing all your work evaluate the following integrals by making a substitution:

   (a)
$$\int \frac{a}{(1+bx)^4}\mathrm{d}x$$

   where a and b are non-zero.

   (b)
$$\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cos^5 x \sin x \mathrm{d}x$$

(2) (10 Marks) If $F(x) = \int_1^x f(t)dt$, where $f(t) = \int_1^{t^2} \frac{5+u^3}{u}du$. Find $F''(2)$.

(3) (10 Marks) Evaluate the limit by first recognizing the sum as a Riemann sum for a function defined on [0,1]:
$$\lim_{n\to\infty} \frac{1}{n}\left(\sqrt{\frac{8}{n}} + \sqrt{\frac{16}{n}} + \sqrt{\frac{24}{n}} + \cdots + \sqrt{\frac{8n}{n}}\right)$$
.

(4) (20 Marks) Find the volume generated by rotating the region bounded by the given curves about the line $y = 3$, using:
(i) Washer method (ii) Cylindrical shells method.
$$y = \sqrt{x-1} \ , \ y = 0 \ , \ x = 2$$

Good Luck